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**U.S. Department of Energy
Federal Energy Management Program**

US Army Begins Nation's Largest Residential Solar Water Heating Project

Press Release Provided By Eileen Yoshinaka, DOE

The largest individual solar water-heating project ever undertaken in the United States will take place on Oahu when the U.S. Army and Hawaiian Electric Company work together to install 650 rooftop systems at Helemano military housing this fall near the North Shore and at Waianae Recreation Center.

The massive solar project will save the U.S. Army Garrison, Hawaii (USAG-HI) about \$250,000 a year in electricity costs, reduce annual emissions by more than 2,200 tons of carbon. This project will trim demand on HECO's electric system by half a megawatt, enough to handle all the electrical needs of more than 150 families, according to engineering estimates.

HECO and USAG-HI both are pursuing goals of helping residents use energy more efficiently. "It just makes sense in Hawaii for military housing," said HECO Account Manager Steve Luckett. "Our partnership with the DOD on Oahu continues to help both parties meet mutual energy goals."

The rooftop systems, with life expectancies of at least 10 years, cost about \$3,000 to \$3,500 apiece. They are projected to pay for themselves in a little less than seven years. The project is expected to be completed before the end of the year.

For more information please contact Eileen Yoshinaka (DOE) at (808) 541-2564 in Honolulu, HI. ■

Electronic Directory Focuses on Software

By Trina Brown, NREL

Interested in renewable energy but don't know where to start at your facility? Ever wondered what your building heating and cooling loads look like? Curious about energy efficient lighting systems for your facility?

If you answered yes to any of the above questions, you may want to take a look at the Building Energy Software Tools Directory on the Energy Efficiency and Renewable Energy Network, EREN. The site describes 210 energy-related software tools for buildings, with an emphasis on renewable energy, energy efficiency, and sustainability. Originally developed by DOE in 1996, this updated version is designed to help researchers,

designers, architects, engineers, builders, code officials, and others involved in the building life-cycle to evaluate and rank potential energy-efficiency technologies and renewable energy strategies in new or existing buildings.



(Continued on p. 4)

Success is in the Air - DOE's Wind Power Purchase in New Mexico

By Milton West, DOE and Steve Huff, DOE

At the DOE Albuquerque Operations Office, the Utility and Energy Management Team (UEMT) recently bought 1.5 million kilowatt hours of wind energy for the Waste Isolation Pilot Plant (WIPP), near Carlsbad, New Mexico. This is the first step toward the DOE Albuquerque commitment to increase its supply of non-hydro renewable energy by about 10 megawatts (MW) by 2010.

Under contract for many years, the Southwestern Public Service Company (SPS) supplies WIPP with system power, and now with wind energy generated at Clovis, New Mexico. DOE's purchase of 80% of the capacity of the Clovis wind turbine triggered a New Mexico Public Regulation Commission requirement that SPS install another wind turbine in the state. The second turbine will double the New Mexico wind energy capacity and will stimulate the New Mexico wind energy industry.

Milton West and Michael Loera, of the DOE Albuquerque UEMT, were assisted by Al Zelicoff and Ralph Wrons, of the Sandia National Laboratories, in acquiring the WIPP wind power. The Sandia Wind Energy Technology Department also worked on this project.

UEMT's decision to buy green power coincided with contract negotiations with SPS for a 10-year electric service contract. In addition to the usual electricity generated from fossil sources, DOE Albuquerque included renewable energy as part of the total requirement for electricity. UEMT used General Service Administration areawide contract with SPS to accomplish its goal.

Staff found that buying wind energy was easier because the SPS Renewable Energy Rider tariff, approved by the New Mexico regulators, was available to most SPS customers. The SPS tariff rate for the 1.5 million kWh of wind energy is \$0.03 (that's 3 cents) a kWh above the cost of system power. The 12-month cost is about \$45,000.

Interestingly, the overall effect of the 3-cent premium was reduced by escalating

fuel cost adjustments. With these adjustments, during a 3-month period, the premium was effectively reduced by 20% to \$0.024 (2.4 cents). This happened because the SPS Renewable Energy Rider Tariff excludes fuel cost adjustments on those kilowatt hours of renewable energy a customer purchases.

DOE funds the wind energy premium with energy cost savings earned from a chilled water storage tank project at the Sandia Processing and Environmental Testing Laboratory in Albuquerque. The cost savings from this tank are conservatively estimated at more than \$90,000 a year.

The Albuquerque UEMT and its Sandia lab partners are exploring options for renewable energy at Sandia's Albuquerque facilities on Kirtland Air Force Base and geothermal power for the DOE Sandia facility at Tonopah, Nevada, and the Los Alamos National Laboratory.

Lessons Learned

The AL UEMT found two elements or lessons learned that made the process smoother.

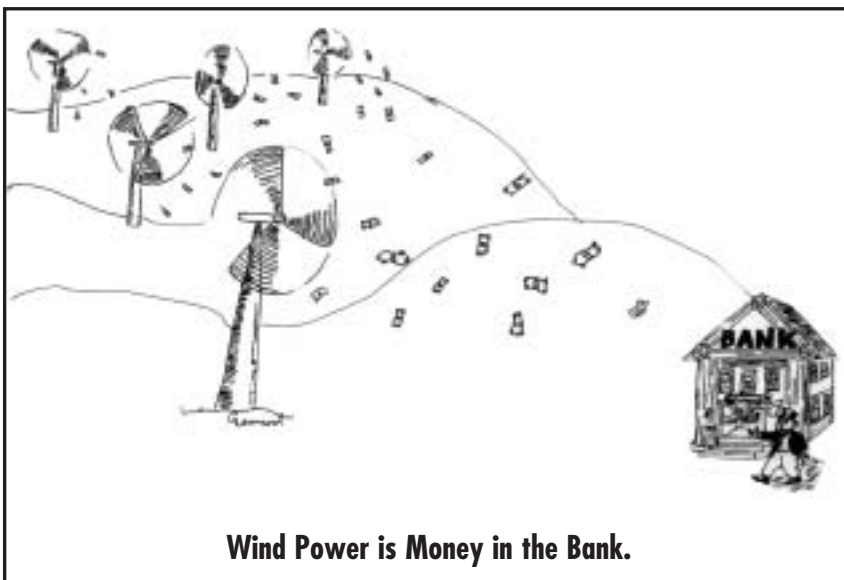
- First, UEMT used the GSA areawide contract and avoided extensive negotiations with the SPS, since GSA staff negotiated all the standard

clauses and requirements earlier. This allowed DOE staff to focus on the SPS tariff, rates and the terms and conditions of service for the WIPP facility.

- Second, the availability of a State-approved renewable energy tariff also made the procurement much easier. With a tariff approved by a State utility or regulatory commission, the price of the energy whether it is for system power or power generated from renewable source is deemed as just and reasonable. This allows the Government contracting officer to avoid an extensive cost and pricing effort.

The renewable energy tariff also provides DOE added protection. After the first year, the AL UEMT can continue renewable energy services on a month-to-month basis or cancel its subscription. With fewer limitations, the opportunity to increase Federal Government use of wind-generated electricity is greatly enhanced.

For more information, please contact Milton West of the DOE Albuquerque Operations Office, Energy Management Team (AL UEMT) at 505-845-4452 or mwest@doeal.gov; Michael Loera of the AL UEMT at 505-845-4302 or mloera@doeal.gov; or Roger Hill of Sandia National Laboratories at 505-844-6111 or rrhill@sandia.gov. ■



Wind Energy Options for the Federal Government

By Ed Cannon, NREL

Wind energy, like nearly all other sources of energy on our planet, is a product of the sun. As the sun heats our atmosphere, it causes temperature variations, which in turn cause airflow or wind. All wind energy conversion devices work by turning the kinetic energy of the moving air into mechanical energy. In ancient applications, that mechanical energy was used to mill grain (hence the name windmills) and to pump water. Water pumping windmills have dotted the rural American landscape since early settlers started migrating west.

Today the cost of wind energy produced by large wind power plants, or "wind farms," at excellent wind sites has fallen to the point where wind is competitive with fossil-fueled generation. Wind turbines are now available at over 1 MW each. Unfortunately, the best wind resources are rarely to be found adjacent to the largest areas of electrical demand. Transmission of electrical energy carries its own costs. So the distance between the most preferable wind sites and significant energy loads add to the cost of delivered energy. Additionally, our aging transmission infrastructure is often slowed by bottlenecks that restrict the energy flow between generation sites and load centers. This transmission challenge affects all generation sources including traditional fuel plants. Therefore, considerable attention is being given to bringing our transmission infrastructure up to 21st century performance. In the 1990's the installed wind capacity increased by more than 25% per year worldwide, the fastest growth rate for any electrical generation source. Photovoltaic (PV) electricity generation is second with a growth rate just under 17% per year, while all other sources are growing at 3% or less annually. By the end of this year, there will be over 4,400 MW of wind capacity installed in the United States and over 20,000 MW worldwide.

Not all wind energy applications are large, utility-scale installations. The modern day descendants of the electrified

farm windmills are very efficient, highly reliable small turbines that can economically produce from a few watts to 50 kilowatts of electric power for a variety of uses. There are also hybrid systems that incorporate a combination of wind turbines, PV panels, and possibly fueled backup generators.

In those states with a net metering program, turbine owners can feed their excess energy generation to the grid during periods when the wind turbine produces more electricity than the turbine owner needs. The current energy crisis in California has made net metering so popular in that state, that small turbine manufacturers reported more sales in the first two months of 2001 than they had in several years prior. It appears that small wind turbines are becoming a reliable, economical energy solution for off-grid applications as well as grid-connected applications – especially in those states with net metering.

An increasing number of utilities are participating in programs to market wind energy as green power. While most of the participants in those programs still pay a small premium for wind energy, rising fuel costs are bringing the day nearer when wind energy will be routinely included in the utility mix; not because it is green, but because it is a fully competitive source of electricity. This is already the case in California, and other parts of the country may soon follow. Wind energy seems to be an idea whose time has come.

For more information or assistance in developing a Federal wind project contact Ed Cannon at the National Renewable Energy Laboratory ed_cannon@nrel.gov or call (303) 384-6920 Fax (303) 384-6901. ■



Electronic Directory Focuses on Software for Energy Efficiency, Renewable Energy, and Sustainable Design in Buildings

(Continued from p. 1)

By Trina Brown, NREL

Whether you're interested in whole building analysis, water conservation, or indoor air quality, the Building Energy Software site has something to offer. The software tools directory can be searched by category, by platform, by country, or alphabetically, making it even easier to find the software you need. Many of the tools are available as freeware or shareware, and both government- and industry-developed tools are listed. Here's just a sample of some of the categories that can be searched:

Whole Building Analysis – including energy simulation, load calculation, renewable energy, retrofit analysis, and sustainable/green buildings analysis.

Material, Components, Equipment & Systems Tools – including envelope systems, HVAC equipment and systems, and lighting systems analysis.

Other Applications – including atmospheric pollution, energy economics, indoor air quality, solar climate analysis, and water conservation, just to name a few.

Codes & Standards – featuring code and standards compliance software.



Don't get left behind in this age of accessible, efficient, and inexpensive computer analysis.

Find the BTS Tools Directory web site at http://www.eren.doe.gov/buildings/tools_directory/. And while you're at it, see FEMP's analytic tools web site at <http://www.eren.doe.gov/femp/techassist/softwaretools/softwaretools.html> for additional software. ■

Nevada Test Site 260 Megawatt Wind Project

By Ed Cannon, NREL

Just 65 miles northwest of Las Vegas, Nevada is a spot that looks a bit like the surface of the moon. More than four decades of nuclear tests, including nearly 2000 blasts above and below the earth's surface, have left some of the landscape at the Nevada Test Site (NTS) cratered and unearthly. The "moon-scaping" process ended in 1992, and currently this chunk of desert bigger than Rhode Island is operated as an environmental research park. Soon a small portion of the land will be put to a new use—easing the California energy crisis and improving the environment.

In January 2001, then-Secretary of Energy Bill Richardson and U.S. Senator Harry Reid of Nevada announced an agreement that could ultimately lead to the construction of over 500 large wind turbines on the NTS. Over 260 megawatts of clean electric power from these turbines will be marketed in Nevada and other nearby states, including California where energy supplies are

so sorely needed. The Nevada Test Site Development Corporation, a non-profit company which works in conjunction with the U.S. Department of Energy to develop new technologies in Nevada, entered into an agreement with MNS Wind Company to develop the wind plant. MNS Wind Company is a new partnership between M&N Wind Power of La Jolla, California and Siemens Energy & Automation, Inc. of Atlanta, Georgia.

Siemens Energy and Automation, Inc. is the project turnkey contractor for the construction of the wind plant, which will be completed in several phases over the next three to five years. The project will create 150 to 200 new jobs, bringing over \$80 million into the southern Nevada economy during the construction phase. Throughout the 35-year operating life of the turbines, an estimated 30 maintenance and operation workers will be employed to keep the plant going.

The first phase will be completed by the end of 2001, supplying 85 megawatts of electricity from at least

120 wind turbines. NEG Micon, a stakeholder in M&N Wind Power, will manufacture the turbines. Each three-bladed turbine will stand atop a 175-foot steel tower, its blades scribing a 160-foot diameter circle in the sky as the attached electric generator churns out 750 kilowatts of power.

The Nevada Test Site wind project is a major development, even in this time of explosive growth in wind energy. At 260 megawatts, it is one of the largest single wind projects announced to date, and its proximity to Southern California offers assistance to a beleaguered energy market. Soon this piece of Nevada desert will begin its transformation into an oasis—an oasis of clean, renewable energy.

For more information, contact Ed Cannon, PE, DE at the National Renewable Energy Laboratory. ed_cannon@nrel.gov or call 303-384-6920 ■

Innovative Financing Makes Solar Energy Affordable

By Andrew Morton, Johnson Controls

Like many Federal sites in the 1970s and 1980s, the Salt Lake City (SLC) Veterans Administration (VA) Medical Center and the Denver Federal Center embraced solar energy. At the SLC VA Hospital, and the Denver Federal Center solar systems were installed for domestic hot water. It was a good news/bad news scenario; more energy was captured than either facility could use, but at both sites. The technology of that time just wasn't sophisticated enough to fully utilize the systems in their capacity to heat domestic water. The systems eventually fell into disrepair. Both sites were still committed to using renewable energy, but other demands made it financially difficult to work them back into operation.

Fast forward to today: technology has improved and new controls systems and redundant pumps now allow the systems to operate at partial loads. The question was: how to pay for the upgrades? In addition to the solar hot water systems, both Denver and Salt Lake City had a list of other energy conserving projects without funding to support them.

Due to Energy Savings Performance Contracts (ESPC), both sites are now successfully using solar energy and financing other energy efficiency improvements.

The energy services company in both these cases was Johnson Controls, Inc. Johnson Controls guarantees the savings, so the agencies won't pay more than their current utility costs. After the investment is paid off, the building owner gets all the subsequent savings. FEMP Super ESPC contracts are set up through each regional DOE office. For more information and a list of qualified contractors go to www.eren.doe.gov/femp.

Through their ESPC, the Salt Lake City VA financed a recommissioning of the solar hot water system, as well as improvements to HVAC equipment, lighting system upgrades, modifications

to the chilled water system and many other projects. The \$4.8 million project involves has an estimated annual energy savings of \$493,000 for an aggregate simple payback of approximately 9.8 years.

The Denver Federal Center repaired its system consisting of eight 4'x10' flat plate collectors. The system generates solar domestic hot water for approximately 410 office workers. The annual DHW load is estimated to be 75.3 MMBtu, of which about 78% will be met by the solar panels.

In addition to improving their solar hot water system and other upgrades, the Denver Federal Center is saving water through an improved irrigation control system. Sensors in the ground indicate when it's time to water the landscaping instead of relying on time clocks. The water savings in the project will total nearly 11 million gallons per year.

"ESPCs can be an extremely effective way for Federal agencies to consider renewable options as they're doing a

comprehensive facility upgrade," says Andy Morton, Program Manager for Johnson Controls, adding "that because of fluctuating energy prices and seasonal temperature differences, the simple payback depends on the part of country you're in". Morton notes that agencies also benefit from ESPCs because they include operations and maintenance training that keeps site managers up to speed on renewable technologies. The contracts also identify repair and replacement strategies to prevent breakdowns and ensure quick problem-solving response time.

Johnson Controls is currently involved in several other renewable energy ESPCs, including wind energy at a NASA site in California, a cogeneration power unit at a Department of Agriculture site in Iowa, and a ground source heat pump at an EPA site in Oklahoma.

For more information, contact andrew.m.morton@jci.com or call 303-932-3795. ■



Solar Hot Water System at Salt Lake City Veterans Administration (VA) Hospital.

WAPA Showcases Thin Film PV Projects

By Bob Parkins, WAPA

The Sierra Nevada Region (SNR), Western Area Power Administration, has installed new thin film PV technology in two new photovoltaic projects totaling 22 kW.

The first project was the installation of 12 kW of Siemens Solar thin film CIS (copper-indium-diselenide) modules at the Folsom, CA, administration building. The project is an outcome of SNR's experience with a 1 kW Beta Test Site that it sponsored with Siemens to test the pre-production CIS technology. "Based on our positive experience with

the Beta Test Site, we procured a 12 kW system to add to our PV Technology Demonstration Project at Folsom, which comprises six arrays with five different technologies to educate our power customers and the public about photovoltaics", explained Bob Parkins, the Energy Services Manager at SNR. "As far as we know, this is the largest Siemens CIS system installed to date" Parkins said. SNR is using the project to test the new Trace Technologies 15208 inverter, a commercial-sized, three-phase inverter adapted from the wind industry.

The second project was another Beta Test Site, Folsom's third for the PV Technology Demonstration Project, comprising 10 kW of BP Solar cadmium telluride "Apollo" modules. The project is the largest "Apollo" array installed and the first placed in the field. "It is heavily instrumented and accessible by an automated data acquisition system", said Parkins. It uses the newly introduced Trace 10208 commercial sized inverter with three phase, 208V output.

For more information, contact Bob Parkins PARKINS@wapa.gov, or call (916) 353-4490. ■



Worker transporting each BP Solar cadmium telluride module to the final site.



Left Roof: 10 kW BP Solar cadmium telluride ("Apollo") PV System

Right Roof: 12 kW Siemens CIS PV System

DOI NPS Completes One of the Largest Photovoltaic Water Pumping Projects in the US

By David Love, Sunwize Technologies

Department of Interior (DOI) National Park Service (NPS) designed and supervised the installation of one of the largest photovoltaic water pumping systems in the United States at the Cottonwood Campground in Joshua Tree National Park in Southern California. The photovoltaic system replaces a diesel generator that was the sole power source for the water system.

The 7.2 kW photovoltaic array powers a 5hp, 230-volt, three phase standard submersible pump with a total dynamic head of 400 ft. to produce 10,000 gallons

of water per day. The 80,000-gallon storage tank serves the campground with an average 2,500 gallons per day use. The solar pump controller runs during daylight hours pumping water into the storage tank (no batteries are needed), the water is gravity fed to the campground. A propane generator is used as backup in the event of a low water situation or for fire fighting needs.

An additional 300-watt system operates two chlorinator pumps for water treatment and provides power for a light in the pumphouse. A telemetry link, driven by a water level sensor in

the remote storage tank, automatically starts the pump when the tank is low.

Photovoltaic water pumping is a natural and preferred power source in this remote and pristine environment that is also one of the sunniest locations in the United States. These systems increase reliability, lower long-term operational costs, and greatly reduce emissions to help the National Park Service meet their goal of protecting the environment and serving the public.

For more project information, contact David Love, Sunwize Technologies at sunwizewa@earthlink.net. ■

FEMP Solar Energy in the 2001 Federal Energy Saver Showcase Facilities Awards

By Trina Brown, NREL

Federal agencies from the General Services Administration to the Fish and Wildlife Service are "showcasing" cost-effective energy efficiency, water conserving, and renewable energy technologies in their facilities. Besides using energy and water wisely and saving taxpayer dollars, benefits of showcasing facilities also include:

- Increased awareness of energy-efficient and renewable energy technologies applicable to both the Federal and private sectors;
- Technology transfer through partnerships between agencies, utilities, manufacturers, and others;
- Implementation of better projects through direct design assistance to selected showcase facilities; and
- Recognition of agency facilities for their efforts.

A total of 18 Federal facilities were recently awarded Federal Energy Saver Showcase designation at the FEMP and DOE sponsored Energy 2001 annual Energy Efficiency Workshop and Exposition held in Kansas City, Missouri. At the ceremony, FEMP's Director, Beth Shearer, presented representatives from each site with their designation plaque. These plaques are then displayed prominently at the showcase facility, notifying visitors they are entering a Government building that uses energy and water wisely and saves taxpayer dollars. These

18 facilities are expected to save the government 50 million kilowatt-hours of energy, or about \$2 million in energy costs, each year.

The following 7 Federal Energy Saver Showcase projects include solar energy such as passive solar design, photovoltaic power, solar hot water collectors and transpired solar collectors:

Department of Commerce – NOAA

- Guam Weather Forecast Office, Barrigada, Guam
A Low-maintenance, energy-efficient building design incorporating natural daylighting and passive solar design.

Department of Defense – Navy

- MCPON Plackett Manor, Great Lakes Naval Training Center, Great Lakes, Illinois
A Leed™ Certified sustainable design project which included extensive use of natural daylighting.

Department of the Interior – Fish and Wildlife Service

- Cusano Environmental Education Center, John Heinz National Wildlife Refuge at Tinicum, Philadelphia, Pennsylvania
Sustainable building design with natural daylighting and the use of geothermal heating and cooling.

Department of State

- Florida Regional Center, Oakland Park Facility, Ft. Lauderdale, Florida
This building showcases two key solar technologies: solar water heating and PV parking lot lights.

Department of Veterans Affairs

- Salt Lake City Health Care System, Medical Center Campus, Salt Lake City, Utah
An ESPC project, which included the installation of a solar water heating system.

General Services Administration

- Ralph H. Metcalfe Federal Building, Chicago, Illinois
A roof-mounted, grid-connected photovoltaic system was installed.

National Aeronautics and Space Administration

- Dryden Flight Research Center, Aircraft Support Facility, Building 1623, Edwards, California
A boiler plant upgrade, which included the installation of a solar ventilation air preheating system.

For more information, please contact Trina Brown at NREL, Trina_Brown@nrel.gov. ■



These Showcase projects represent some of the best applications of energy efficiency and renewable energy technologies in the Federal sector and each helps our government save money and run more efficiently. Beth Shearer, FEMP Director, commends all the individuals and agencies who have contributed to the successful implementation of these 18 projects.

GEMS: Resources and Upcoming Events

Visit Database of State Incentives for Renewable Energy (DSIRE) updated website at www.dsireusa.org to gain quick access to summary tables for Financial Incentives, Regulatory Policies, and Community Investment & Awareness programs. New features include a description of each incentive type, a printable version of each table, and guidance for navigating the site. Also available is the updated Database of Schools Going Solar program. DSIRE is funded by the U.S. DOE's Office of Power Technologies and managed by the NC Solar Center on behalf of the Interstate Renewable Energy Council.

Websites

Check out the American Wind Energy Association's web site at www.awea.org. This site contains an on-line bookstore, wind energy news, standards and technical information. Inventory of state incentives for wind energy and much more!

Financial Incentives

California has a very active financial incentive program for distributed generation. "Self Generation" referring to distributed generation technologies (microturbine wind turbines, photovoltaics, and fuel cells) is installed on

the customer's side of the meter that provide all or a portion of the customer's electric load.

Financial incentives include:

- \$1,000/kW for microturbines utilizing waste heat recovery up to 1 mw with a maximum 30% of project cost.
- \$2,500/kW for wind turbines and fuel cells (operating on non-renewable fuel) up to 1 mw and 40% of the project cost.
- \$4,500/kW for photovoltaics and fuel cells (operating on renewable fuel) up to 1 mw and 50% of project cost.

See www.energy.ca.gov/index.html.

Upcoming Conferences

NOVEMBER 2001

ISES Solar World Congress 2001

November 25 - December 2, 2001
Adelaide, Australia
Contact: Hartley Management Group Pty Ltd.
P. O. Box 20
Kent Town 5071, South Australia
Phone: +61 8 8363 4399
Website: www.unisa.edu.au/ises2001congress/home/html

EnergyNOW

November 28, 2001
Arlington, VA
Register online at
https://secure.laser.net/cmpinc_net/energynow/register.html

Business Energy Solutions

November 28 - 29, 2001
Orlando, FL
Contact: The Association of Energy Engineers 770-925-9633
Website: www.aeecenter.org

Energy Technology Expo

November 28 - 29, 2001
Chattanooga, TN
Contact: Paula Brown at 865-632-2974

DECEMBER 2001

Management & Technology of Energy & Environment 2001 (MTEE 2001)

December 7 - 8, 2001
Irvine, CA
Contact: M. King at 714-898-819

Power-Gen International

December 11 - 13, 2001
Las Vegas, NV
Website: www.pennwell.com

JANUARY 2002

Labs for the 21st Century 2001 Conference

January 7 - 10, 2002
Washington, DC
Register online at <http://www.epa.gov/labs21century/conf/conf2001/register.htm>

MARCH 2002

17th Photovoltaic Symposium

March 13 - 15, 2002
Staffelstein, Germany
Contact: Leonore Nanko, Otti Energie-Kolleg
Phone: 49 941 296 8824
Website: www.otti.de

APRIL 2002

Implementing Renewable Energy Projects Workshop

April 2 - 3, 2002
Washington, D.C.
US DOE FEMP & NREL
Contact: ImaginIt (303) 526-5528
Website: www.imaginittech.com

MAY 2002

The 8th National Clean Cities Conference

May 12 - 15, 2002
Oklahoma City, OK
Contact: Kimberly Taylor at 303-275-4358
Website: <http://www.ccities.doe.gov/conferences.html>

International Symposium on Power Generation and Renewable Energy Resources (PGRES '02)

May 13 - 15, 2002
Marina Del Rey, CA
Website: <http://www.iasted.org>

29th IEEE Photovoltaic Specialists Conference

May 17 - 25, 2002
New Orleans, LA
Contact: John Benner at (303) 384-6765
Website: www.nrel.gov/events.html

JUNE 2002

Energy 2002

June 2 - 5, 2002
Palm Springs, CA
U.S. DOE FEMP
Contact: Joann Stirling at (800) 395-8574
Website: <http://www.energy2002.ee.doe.gov/Default.htm>

WINDPOWER 2002

June 2 - 5, 2002
Portland, Oregon
American Wind Energy Association (AWEA)
Contact: AWEA, 202-383-2500
Website: www.awea.org/events/

2002 Future Car Congress

June 3 - 5, 2002
Arlington, Virginia
Contact: Nicole Seawell, 703-823-4300 ext. 111

SOLAR 2002: ASES National Solar Conference

June 15 - 19, 2002
Reno, NV
American Solar Energy Society (ASES)
Contact: ASES at (303) 443-3130
Website: www.ases.org

JUNE 2003

ISES 2003 Solar World Congress

June 14 - 19, 2003
Sweden
International Solar Energy Society (ISES)
Contact: SERC Dalarna University
Phone: 46 243 19070
Website: www.hvac.chalmers.se/seas/congress.htm ■



Juggling our energy options isn't as easy as it looks

FEMP Promotes Renewable Technology Training

The Federal Energy Management Program (FEMP) recently presented two "Implementing Renewable Energy Projects" courses. One course was taught in Albuquerque, NM on May 30 – 31, 2001, in cooperation with NREL, the US Dept. of Health and Human Services, and Indian Health Services. Scott Waldman, HHS Energy Officer, initiated this course, in partnership with FEMP. The two-day course was attended by 25 federal energy coordinators, mechanical, civil, and electrical engineers, facility managers, and representatives from the Navajo Tribal Utility Authority. The course focused on implementing projects at Federal facilities using technologies such as photovoltaics, solar water heating, solar air ventilation preheating, geothermal heat pump technology, wind systems, as well as project screening software and the "how-to's" of financing projects. Special thanks to Marlene Brown at Sandia, who transported a PV interactive display for a lunchtime "hands-on" presentation, and Claude Schleyer, Facilities Engineer at the Albuquerque IHS Hospital, who conducted a tour of



Instructors for the FEMP Implementing Renewables Workshop on the road in Albuquerque, New Mexico.

the ground source heat pump project recently installed at the hospital.

The second FEMP course was held at the National Renewable Energy Laboratory in Golden, Colorado on September 5th and 6th. Given the unique location, the 28 students enjoyed a tour of the Solar Energy Research

Facility, the Outdoor Test Facility for Photovoltaics, NREL/FEMP engineer – Otto Van Geet's off-grid home, that is powered by photovoltaics, and a hands-on FRESA software demonstration at the NREL Computer Lab. The course instructors also gave presentations covering all the traditional topics in the Implementing Renewable Energy Projects course.

These annual courses prepare attendees to identify possible cost-effective renewable projects for their facilities, evaluate the benefits and constraints of different technologies, and initiate and propose cost-effective projects and green power to their management.

If you missed these courses, plan to attend the next "Implementing Renewable Energy Projects" course, which will be held on April 2-3, 2002 in Washington, D.C. NREL is looking to partner with another agency to sponsor the course. For further information, or to register, please contact ImaginIt llc at (303) 526-5528 or Nancy Carlisle at NREL (303) 384-7509 ■



PV - trailer is used as an educational tool by Engineer Marlene Brown, Sandia National Laboratory.

Green Building 2002 Challenge

Along with 16 other countries, the United States accepted the Green Building Challenge, an international effort to evaluate and improve the performance of green buildings. GBC started out as a competition to see which country had the greenest buildings and evolved into a cooperative process among countries to measure the performance of green buildings. While the auto industry can measure efficiency by miles per gallon, the buildings industry has no standard way to measure a building's energy and environmental performance. The founders of the Green Building Challenge hope that better tools for measuring green buildings will lead to a higher level of performance for green buildings. The ultimate goal is to develop buildings that contribute to global sustainability by conserving natural resources and minimizing energy use.

U.S. Team Evaluates Green Buildings

The U.S. Green Building Challenge team presented case studies of five buildings at an international meeting in The Netherlands in October. The United States and teams from other countries selected green buildings for the case studies and then used an evaluation tool

developed for the GBC. The goal is to improve the evaluation software tool, called the Green Building Assessment Tool (GBTool), so that it can be used internationally, while taking into account regional or national conditions. GBTool helps to assess and evaluate the energy and environmental performance of three buildings types: schools, multi-family residences, and small-scale office buildings.

Five Innovative Buildings Selected for GBC 2000

- Cambria Office
- Southcentral Regional Office
- Adam Joseph Lewis Center, Oberlin College
- Thoreau Center for Sustainability
- Zion Visitor Center and Comfort Station

Two of the five projects selected are Federal projects: Thoreau Center for Sustainability and the Zion Visitor Center at Zion National Park. Both include photovoltaics and passive solar design strategies. These five projects were selected not only because they are

green, but also because building data is available as inputs to the software tool. The tool has been refined since the first Green Building Challenge in 1998, and participating countries will provide feedback to further improve the tool at the Green Building Challenge 2000.

Green Building Challenge is an international collaborative effort to develop a building environmental assessment tool that exposes and addresses controversial aspects of building performance and from which the participating countries can selectively draw ideas to either incorporate into or modify their own tools.

Green Building Challenge 2002 is a continuation of the GBC '98 - 2000 process and a multi-year period of review, modification and testing of the GBC Assessment Framework and Green Building Tool (GBTool) - the operational software for the assessment framework. This current round of the GBC process will culminate in the presentation of the assessed buildings at the Sustainable Building 2002 Conference (SB 2002) held in Oslo, Norway in September 2002. ■

Goals and Objectives

The three general goals for the Green Building Challenge process are:

- To advance the state-of-the-art in building environmental performance assessment methodologies.
- To maintain a brief on sustainability issues to ascertain their relevance to "green" building in general, and to the content and structuring of building environmental assessment methods in particular.
- Sponsor conferences that promote exchange between the building environmental research community and building practitioners and showcase the performance assessments of environmentally progressive buildings.

These goals reflect the acknowledged success of the GBC process in having significantly increased the understanding of building environmental assessment through international collaboration. In addition to the above general goals, two specific objectives of GBC 2000 process are:

- To develop an internationally accepted generic framework that can be used to compare existing building environmental assessment methods and used by others to produce regionally based industry systems.
- To expand the scope of the GBC Assessment Framework from green building to include environmental sustainability issues and to facilitate international comparisons of the environmental performance of buildings.

Smithsonian Institution Goes Solar

By Melinda Humphry Becker, Smithsonian Institution

The Smithsonian Institution is employing several architectural projects as a vehicle to promote photovoltaic (PV) technology to Smithsonian staff, designers, contractors, and the public by showcasing PV technology and providing information about it for their understanding and use. Following are examples of current PV projects:

NASM STEVEN F. UDVAR-HAZY CENTER

The 760,000 square foot (70,604 m²) Steven F. Udvar-Hazy Center, a \$238 million expansion of the National Air and Space Museum, will showcase approximately 200 aircraft and 100 major space artifacts, and house hundreds more. For the first time, the museum will be able to display rare, historic and some massive artifacts in a way that dynamically depicts the entire story of flight. The Center is scheduled to open in December 2003 to coincide with the 100th anniversary of the Wright Brothers history-making flight near Kitty Hawk, and will represent 21st century air travel through its architecturally striking design. A number of the artifacts that will be in the museum are the first PV powered satellites. FEMP

worked with the Smithsonian Institution to bring PV technology to the project to show the link between 1st space based PV applications and current technology.

Kiss + Cathcart, Architects designed two building-integrated photovoltaic (BIPV) systems for the Center, which will be positioned to highlight PV as a demonstration project and teaching tool for the 4 to 5 million annual visitors. These two systems include the glazing at the entry and on the bus canopy and are visible upon entering the building.

BP Solar donated 105 kilowatts of both polycrystalline and amorphous-silicon thin-film panels, as well as providing the structure and glazing for a third location on the entry canopy of the parking gatehouse, which is the visitors first impression of the entire complex. In addition, BP Solar has agreed to back up the donation with funds for an educational program about PV for the hundreds of school groups who visit the museum each year.

SMITHSONIAN TROPICAL RESEARCH CENTER

The Smithsonian Tropical Research Center (STRI) in the Republic of Panama is one of the worlds leading centers for

basic research on the ecology, behavior and evolution of tropical organisms. Scientists from around the world come to STRI to join the search for knowledge in fields that include animal behavior, plant ecology, canopy biology, paleoecology, archeology, evolution, genetics, marine ecology and anthropology.

Currently, the facility uses diesel generators for power in remote locations, which poses a threat to the tropical environment. In this situation, the environment itself is also the laboratory, so it's even more important that the environmental impact by the facilities or by powering the facilities is minimized. A major motivator for STRI to pursue solar energy is the problem of daily power outages, which often cause scientists to lose valuable research data. The Smithsonian Institution received a (FEMP) grant in November 1999 to provide three 2-kilowatt replicable systems in remote locations of Panama. Two systems were installed in Bocas del Toro and one system in Higante near the Canal in November 2000. Scientists are thrilled with the PV systems; it's all the power they need for these small labs, which house two or three scientists for several months at a time.

*NASM Steven F. Udvar-Hazy Center
Dulles International Airport, VA*



*BI PV Canopy for Gatehouse at NASM Steven F.
Udvar-Hazy Center*



PV system being installed at STRI Republic of Panama



St. Base Camp at University of Hawaii

SMITHSONIAN ASTROPHYSICAL OBSERVATORY

The Smithsonian Astrophysical Observatory is one of the most diverse astrophysical institutions in the world. It has pioneered the development of orbiting observatories and large land-based telescopes, the application of computers to astrophysical problems, and the integration of laboratory measurements, theoretical astrophysics, and observations across the electromagnetic spectrum.

The Smithsonian Institution is currently designing a new base camp at the University of Hawaii at Hilo Science Park to support the telescope on the summit on Mauna Kea. Repairs, operations, development and much of the scientific data analysis will be done from this base facility with only a small crew traveling to the telescope on any given day. This new 16,000 square foot (1,486 m²) base camp will house offices, laboratories and support space, and showcase the PV products.

Design of the PV systems, which began in February 2001, is supported through technical assistance from the Federal Energy Management Program (FEMP) and the National Renewable Energy Laboratory (NREL).

SMITHSONIAN ENVIRONMENTAL RESEARCH CENTER

The Smithsonian Environmental Research Center (SERC) in Edgewater, Maryland is dedicated to increasing knowledge of the biological and physical processes that sustain life on earth. SERCs interdisciplinary research applies long-term studies to examine the ecological questions about landscapes of linked ecosystems, especially those impacted by human activities. SERC is part of a global network of sites conducting ecological research relevant to each geographical region.

SERC currently occupies 42,000 square feet (3,901 m²) of laboratory, office, educational and support space, including a 10,000 square foot public education building on the shoreline for children, teachers and other visitors to SERC. SERC has received a FEMP grant to include PV in the design of a new visiting scientist-housing complex consisting of six duplex units, and a seminar/conference building. The fully developed housing complex will provide accommodations for 24 researchers. The Smithsonian Institution will look at the SERC campus as a whole when considering locations and types of PV systems to include, possibly incorporating solar hot water heating or solar parking lot

lighting. The Smithsonian is committed to including an educational program about PV and renewables in general to coincide with the existing educational program. SERCs education programs in ecology demonstrate to the public the active process of research, and infuse scientific approaches for environmental issues through experiencing nature. It is imperative, when considering that SERC trains future generations of scientists to address ecological questions of the nation and globe, that renewable energy and sustainability be utilized.

SMITHSONIAN MARINE STATION AT FT. PIERCE

The Smithsonian Marine Station at Ft. Pierce, (SMS) specializes in marine biodiversity and ecosystems of Florida. Research focuses on the Indian River Lagoon and the offshore waters of Florida's east central coast, with comparative studies throughout coastal Florida. The SMS is part of the National Museum of Natural History in Washington, D.C., and serves as a field station, which draws 100 top scientists and students each year from the Smithsonian and collaborating institutions around the world.

The Pilkington International has donated six PV panels (roughly one kilowatt of power) to be installed on a storage facility.

For more information contact Melinda Humphry, Becker at humphm@opp.si.edu <<mailto:humphm@opp.si.edu>>. ■



*Smithsonian Institution
Astrophysical Observatory
at Mauna Kea, Hawaii*



Smithsonian Institution Environmental Research Center, Edgewater, Maryland



Smithsonian Institution Marine Station, Ft. Pierce, Florida

Tribal Clinic PV Hands-on Installation and Workshop

By Patrina Eiffert, ImaginIt LLC

Only limited funding was available to procure a small PV system for the Flandreau Santee Sioux Tribal Clinic in South Dakota. Given a tight budget, it was determined that a good strategy to save money was to purchase a PV system through the GSA Federal Supply Schedule. Then conduct a hands-on training workshop where the students would provide the labor to reduce the cost of installation. The successful workshop, with 23 participants, was held in August in conjunction with the Flandreau Santee Sioux Tribe, Indian Health Services, NREL FEMP, NREL State and Local Initiatives, Western Area Power Administration, Sundance Solar and ImaginIt.



Classroom instruction by Bob Parkins (WAPA), Andy Walker (NREL) and Patrina Eiffert (ImaginIt)



Field instruction in mounting a PV array.



Field instruction in wiring a junction box by Kerry Kalarney, Sundance Solar

The first half-day session included classroom instruction covering the basics of PV technology, an overview of utility and practical issues, and a synopsis of state-of-the-art Building Integrated PV. The following one and a half day was held in the field with hands-on instruction during the installation. Course Instructors included Bob Parkins, WAPA, Andy Walker Ph.D., NREL, and Patrina Eiffert Ph.D., ImaginIt.

The grid-connected system is comprised of 16 Uni-Solar US-64 triple junction, thin film amorphous silicon modules. These modules were selected due to local conditions, since winter temperatures fall well below 0° F and severe thunderstorm activity with hail is common. The new field applied Uni-Solar flexible roofing laminate was considered to create a building integrated system. However, the field applied roofing laminate was not selected because the standing seam

metal roof pan profile on the building was not smooth. The roof has two ridges that would prevent the proper adhesion of the laminate. So ground mounted arrays were specified. The eight modules were mounted to a pole as two strings, each string comprising of four modules in series. The two poles and four strings have a peak DC production of 1 kW STC. Note: Uni-Solar modules have been changed from a 10-year warranty to a 20-year warranty. ■



Array installation completed. The next step utility interconnection and clean-up.




Inverter feeding AC electricity into building power supply and connected to utility meter.



Completed kW PV System, Flandreau Santee Sioux Tribal Clinic

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Save with Solar & Wind

Save with Solar & Wind: A Technical Bulletin for Federal Solar Energy Champions

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Produced for the
U.S. Department of Energy (DOE)
Federal Energy Management Program
by the National Renewable Energy
Laboratory, a DOE national laboratory

DOE/GO - 102001-1487
Winter 2001/2002



Printed with a renewable-source ink on
paper containing at least 50% wastepaper,
including 20% postconsumer waste

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**Zion National Park Visitor Center - The NPS has worked with NREL to create a new sustainable building to serve as a visitor center for the park's current 2.5 million annual visitors as well as visitors in the future.
Picture Credit: Robb Williams**